REMARKS ON POST-TERTIARY *PHASCOLOMYIDÆ*.

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In furtherance of some future catalogue of the post-tertiary fossils of Queensland locally preserved, the wombat contents of the collection have in their turn undergone examination. From that scrutiny one rises with the impression that our recorded knowledge of the family is not in every respect as certain or, on the whole, quite as complete as it might be, and there ensues a desire to ask that one judgment delivered respecting them may be reconsidered, and one species added to their number. But before all things it is obligatory to declare that the task of determining the extinct species of *Phascolomys* could not have been undertaken at the antipodes prior to the publication of Mr. Lyddeker's Catalogue of Fossil Marsupials, followed by the Catalogue of Recent Marsupials placed in our hands by Mr. Thomas. To the labours of both these writers we in Australia are deeply indebted. But we may presume that neither of the authors would insist upon his determinations being considered as in all cases final, for it must be that conclusions based on a comparatively small number of specimens, or upon descriptions alone, will undergo some modification. More especially is this to be expected in cases of opinion founded on a few cranial remains of the wombats that were. Naturalists will agree that if we neglect the "personal equation," observation may generally be taken to vary in value as the material observed varies in quantity, and on this account they will not mistake for an idle vaunt the statement that the collection of wombat fossils examined contains over two hundred specimens, exclusive of vertebræ, and so forms, it is believed, by far the largest series as yet gathered from that prolific field, the valley of the Condamine.

To begin with a general conclusion, the opinion which I have previously ventured to express, namely, that the ossiferous deposits of the Darling Downs and those of the Wellington Caves are not upon the same palæontological horizon, receives support from the phascolomine peculiarities of their respective contents. So far as can be learned from the British and Queensland collections, the cave wombats, *P. latifrons*, *krefftii*, and *curvirostris*, were not in existence when the Queensland breccias and turbaries were laid down; and, on the other hand, *P. parvus* and the species to be described in the sequel had disappeared before the Wellington caves received their contents. It would not be reasonable to accept in explanation of the apparent facts the supposition that they inhered in contemporaneous but diversely conditioned faunas. The habitats were too near to each other and persisted under geographical conditions too similar in kind, and on the whole too continuous one with another to leave any plausibility in the suggestion. But if the faunas were successive, as the alternative supposition must affirm, they denote the limits of a great interval of time, of a space sufficient to effect in this particular instance the extinction of two and the development of three species. The lapse of some considerable part of this interval has probably been notified to us by certain fossils which show that one of the associations characteristic of the Nototherian age, *Ceratodus* with a fresh water saurian, was still permanent in Southern Queensland when the denudation of the basalt had so far progressed as to cause the formation, in suitable positions, of deep beds of "black soil." Teeth of the fish and alligator with other vertebrate remains, (including a piece of a chelonian carapace of great thickness identical with fragments from the Downs), all evidencing a first burial *in situ*, have been met with near Brisbane at a depth of 80 feet in a dark basaltic loam with celestine and other derivative minerals. These interesting fossils are deposited in the Queensland Museum.

A second conclusion is that that no living species of wombat has come down to us from the age of the Condamine beds. This is an assertion which contradicts accepted evidence, and will, therefore,

have to be substantiated by further and, as it appears to me, more conclusive evidence. Assuming its truth for the moment we must accept the consequence, that the cave fauna, in which we are told there appears an existing species (*P. latifrons*), is partially of later origin.

Phascolonus, Owen, is demonstrably a good genus, but the ground on which it has been separated, namely, by identification with *Sceparnodon*, a determination so improbable in itself that nothing short of direct proof should suffice to give it currency, appears to me quite inadequate, to say the least. Owen's suspicion that this great wombat in skull and teeth might one day show itself to be generically distinct from *Phascolomys* was a happy conception, but it is not by means of the teeth and skull exclusively that its differentiation may be proved. In each of the other known parts of its skeleton there are departures from normal phascolomine characters amply sufficient to determine the judgment in favour of its separation from *Phascolomys*. It is unnecessary to go into details to settle an undisputed question, but to anticipate an objection which might be taken to proofs derived from isolated bones in this and other cases on account of the uncertainty attaching to their determination, it may be permissible to state the process by which the identification of Phascolonus bones was ascertained.

While taking measurements of the bones of a *Phascolomys platyrhinus* for comparative purposes, it was observed that the width of the distal end of the humerus corresponded very closely with the length of the upper molar series, the millimetres being 54·5 and 53·5 respectively. Naturally it seemed not impossible that a similar equation might obtain in an extinct species. To put the notion to the test search was made for a phascolomine humerus which should be in width about equal to the length of the series of upper cheek teeth in a *P. gigas*, namely, 105 mm. The bone was fortunately discovered and found to measure 104 mm. It was then assumed with some degree of confidence that twice the linear dimensions of *P. platyrhinus* might be

adopted as a metrical guide to the recognition of any other Phascolonus bones in the collection, or conversely that any phascolomine bones found to yield the required measurement in two dimensions might, with the consent of other characters, be taken as belonging to the same animal as the skull; and on this basis the identifications of the proximal end of a second humerus, two femurs, three tibias, a fibula, two scapulas, two ulnas, a radius, ischium, trapezium, trapezoides, astragalus, naviculare, calcaneum and cuboid, or characteristic parts of them, were successively established. It may be well to state distinctly that while these bones are unmistakably phascolomine they almost invariably present conspicuous marks of differentiation from *Phascolomys*— for examples, the bridge across the entepicondylar canal of the humerus does not subside at once into the shaft as in the pure wombats, recent and extinct, but is continued upwards as an elevated ridge, merging into the deltoid ridge above, and the astragalus has its rotular groove deeply sunken and all its ridges elevated, whereby it is easily discriminated from the smooth-surfaced bone of *P. medius* and its dwarfed copy in the recent *P. platyrhinus*. At the same time it must be observed that the extent of differentiation shown by these bones is by no means so great as that which we shall probably find to be correlated with the non-phascolomine incisors of *Sceparnodon*.

In addition to the above-named bones of the tarsus, there are in the collection several which show that although the animal was as a rule about twice the length of *P. platyrhinus*, it not unfrequently exceeded that length by more than one-third. The astragalus referred to is 44 mm. in breadth, against 22 mm. in the living *P. platyrhinus*, but by its side is a second measuring 51·5, another 55·5, and still another 60 mm., yet no one of these can be specifically distinguished from the rest. The naviculare again is accompanied by two others, the respective lengths of the three being 41·5, 54, and 56. With the largest astragalus are associated its naviculare, calcaneum, and cuboid, and arranged with them are the four metatarsals, but these have been contributed by other feet. Of foot bones of this larger size there are in all sixteen

examples, or nearly a third of the whole number of cranial and appendicular bones of *Phascolonus* in the collection.

Adverting to the smaller species—on the assumption that the living *P. platyrhinus* is identical with the fossil *P. mitchelli*, as it is said to be, the latter is the only recognizable species of its size as yet recorded from the Darling Downs. *P. thomsoni*, Ow., is an extremely doubtful species, uniquely represented, and dependent for its validity upon a single character, the backward extension of the symphysis, a character which varies with age and, in mandibles of *P. mitchelli*, shows its inconstancy thus:—in one example it extends to the fore lobe of m^3, in four to the interval between m^3 and m^2, in five to the hind lobe of m^2, and in four to the interval between m^2 and m^1. *P. thomsoni* should, therefore, be expunged from our lists. But whether it be so or not is of slight moment in a question of appeal to bones other than those of the head. A species which has left us but a single fragment of its jaw is not likely to have handed down other parts of its skeleton; at any rate it is not entitled to priority of consideration over those whose cranial remains are numerous. We may, then, for the present proceed on the assumption aforesaid, namely, that there was but one wombat of the size of *P. platyrhinus* to remit its limb bones for study; then as bones of a wombat of that size, showing the like dimensional correspondence with the teeth of *P. mitchelli* as that observed in the case of *P. gigas*, are extant, the question simply is, are they, as the identification requires, fossilised bones of *P. platyrhinus*. One answer alone is possible, they are not. If not, then either the numerous cranial and mandibular remains of platyrhine wombats referred to *P. mitchelli* in the Queensland Museum, and there constituting it the commonest species, belong to some undescribed species unknown in the British Museum, and not to the species also most numerously represented by such remains in the British Museum, or the identification is at fault. It is now incumbent upon me to show that these bones, which under the circumstances must necessarily be ascribed to *mitchelli*, are not bones of *platyrhinus*. They comprise two humeri, three femurs, a tibia, and two ulnas.

The humerus is seen at a glance to be much stouter, but as the condylar region of the more perfect specimen is wanting its relative proportions cannot be ascertained with precision. With an approximate length of 124 mm., against 122 in *platyrhinus*, the width of the shaft at its proximal third is 3 mm., its antero-posterior thickness 2·5 mm. greater; it is, therefore, 2·5 mm wider than in a recent bone of the same length; at the proximal end the long diameter of the head and greater tuberosity is 2·5 mm., the short diameter across the head only 0·8 mm. greater; in this region it is, therefore, relatively longer and of a different form. Although the head is but little larger antero-posteriorly, it is produced downwards upon the hinder surface of the shaft much more than in *platyrhinus*, more even than in *latifrons*, and with a still more angular margin than in the latter species. The importance of this exaggeration of one of the features peculiar to *latifrons* should be duly appreciated. The ectotuberosity, as to size, is in about the same proportion to that of the head as in *platyrhinus*, but it is smoother, more symmetrical in form, wants the triangular facet, and descends lower on the shaft; the extent of its base on the thenal side is platyrhine rather than latifront. In the extension of the transverse diameter of the proximal end of the shaft we see, on the other hand, a second latifront character in excess. The lesser tuberosity resembles that of *platyrhinus* but is not so distinctly grooved off from the head, nor does it descend in a pointed form on the entothenal edge. The teretotriceps ridge is extremely short and in shape oval, very different both in form and extent to that of either of the living species; midway between it and the head is a tuberiform ridglet, perhaps an outlier of the other. The pectoral ridge is an elevated line descending continuously from the greater tuberosity, in other structural respects most nearly resembling that of *platyrhinus*, but differing in position as it marks off the inner third instead of the inner half of the shaft. The prominence and retroflexion of the angle of the deltoid ridge are intermediate in degree between those exhibited by *platyrhinus* and *latifrons*. The deltoid and pectoral ridges do not converge distad, the surface between them is comparatively flat, and the

only representative of a predeltoid ridge is a low prominence just proximad of the middle of the long oblique margin joining the ends of the two ridges. The breadth of the delto-pectoral surface is 15 mm. against 12·5 in *platyrhinus*, wherein again we recognise an intermediate character. The triceps ridge on the anconal aspect of the shaft is still less developed than in *platyrhinus*. The absence of the supinator ridge and of the condyles precludes further comparison, but perhaps enough has been said to render it unnecessary. It may already appear that the bone, so far from representing *P. platyrhinus*, has several characters which suggest that, on the whole, *P. mitchelli* was less specialised than are the living species of which it was probably the common source.

Of the femur the length and the least transverse diameter are respectively 168 and 17·5 mm., in *P. platyrhinus* they are 163 and 14·5, in *P. latifrons* 141 and 17 ; *platyrhinus* it would seem has retained length and lost thickness, *latifrons* has lost length and retained thickness. The breadth of the distal end (39 mm.), the transverse diameter of the head (36·5), and its antero-posterior diameter (26) are all greater than in either of the continental species living. As in the humerus, so in the femur, the head descends considerably lower and overhangs the shaft to a greater extent than in existing forms. The lesser trochanter is relatively larger in all its dimensions ; the rough-surfaced excavation in front of its distal extension is much broader and deeper but has no sunken pit at its proximal end ; the subtrochanterian ridge is more exactly reproduced in *platyrhinus* than in *latifrons*. Between the summits of the two trochanters the distance is 47·5 mm. against 44 in living species, consequently the neck is proportionately broader. The inner condyle is 36 mm. in its antero-posterior dimension, that of *platyrhinus* being but 31, and its superiority in height over the outer condyle is, therefore, more conspicuous ; the outer condyle is more distinctly grooved off from a rather broader ectepicondyle ; the intercondylar notch is wider, the anterior limit of its surface better defined, its whole surface comparatively smooth ; a convexity of the surface near its posterior end forms a low transverse bar between the condyles. Of the deep pit seen in

the shaft at the base of the outer condyle of *platyrhinus* there is no trace in the fossil.

Two forms of tibia present themselves, one (with three examples) much less unlike that of *P. platyrhinus* than the other, but, nevertheless, to be preferred for reference to *P. mitchelli*, for though unexpectedly thin and angular it is much less so than its companion. With extremities no greater in size, the fossil of this form is in its total length distinctly (one-twelfth) greater than in recent bones. Compared with the humerus it must, therefore, be considered slender. In general shape it is like that of *platyrhinus*, but its shaft has a little stronger curve and a rather greater dilatation of its edge at the junction of the proximal and middle third of its length. The posterior surface of the shaft is broader and flatter and its edges, but especially the distal half of the inner edge, are sharply angular. The cavity for the outer condyle of the femur is, unlike that of *platyrhinus*, circular; the space between it and the procnemial tuberosity much more elevated, causing the articulating part of the head, when viewed laterally, to appear much longer; the tuberosity is shorter, the inner edge of the entocondylar surface is not produced into a point adjacent to the facet for the head of the fibula, and the spine is both higher and sharper. At the distal end the anterior edge of the shaft is more compressed, the scaphoid moiety of the inner malleolus is narrower and more sharply grooved off from the rest of the malleolus. Perhaps no one of the several differences which have been noticed would be sufficient of itself to distinguish this tibia from others, but, taken together, the discrepancies between it and that of *platyrhinus* are altogether prohibitory of specific identity between the two. Of this bone the collection contains one nearly perfect from the right side and two opposite halves from the left side.

Until it can be shown that the fossils which have been brought forward are not really bones of *P. mitchelli*, that is until genuine bones of *P. platyrhinus* are found fossil on the Condamine, or until another species of extinct wombat to which they can more probably be referred becomes known, it may, I think, be accepted

as a proved fact that *P. mitchelli* is not synonymous with *P. platyrhinus*. Against this it will be urged that naturalists of approved sagacity and wide experience have seen reason to come to the opposite conclusion. That they have done so is not at all surprising. There is no difficulty in believing that there is, on the whole, sufficient resemblance in cranial and dental characters to lead observers who were compelled to trust to those characters alone to the decision they have announced. But it is questionable whether we ought to trust to them alone so implicitly as to pronounce an unreserved opinion in cases where material is scanty, specialization feeble and apt to be obscured by the accidents of burial, and where the question is between a living animal and a companion of extinct species. The present is not the first experience which has convinced me that such a course may lead to error.

P. mitchelli is, however, not the only wombat of its size which found burial in the Darling Downs deposits, though the only one to which the bones already noticed could have belonged. There was a species distinguishable almost at a glance by the narrowness of its teeth, which are intermediate in breadth between those of *P. parvus* and *P. mitchelli*, though serially as long as or longer than in the latter species. As a marked reduction in the width of the teeth has not been noted in the descriptions of known species, and as the teeth in all the mandibles of *P. mitchelli* are appreciably the same in width, I must perforce regard this narrow-toothed wombat as a new species, for which the name *angustidens* may be appropriate.

Mandibular characters:—Teeth narrow, in a relatively long series; posterior molars oblique; premolar large, subrectangular, with its long axis in the axis of the jaw; symphysis rather short.

The species is founded on four mandibular specimens, two of them from the same mandible. The more perfect of the latter shows the whole of the dentary limb from the incisor outlet to the base of the coronoid process with all the teeth except the incisor in place. The length of the molar series is 52·5 mm., in an

average jaw of *mitchelli* it is 51; the width of m^3 is 6·8 mm., against 7·8 in *mitchelli*, the difference of a millimetre throughout the series asserting itself plainly to the eye. The premolar is unusually large and unusually rectilinear in form; the midline of its flat inner side is sharply impressed with a vertical groove, and its longitudinal axis is all but coincident with the longitudinal axis of the alveolar series. The lobes of m^1 are as usual nearly at right angles to the line of teeth, those of m^2 are distinctly oblique, of m^3 more so, and of m^4 still more so. The lower contour of the jaw is flatly arched, being rather the deepest in the middle and not less deep beneath p^4 than under m^4—it approaches that of *platyrhinus* and differs much from that of *mitchelli*. The coronoid process is, at its base, more than usually exserted from the side of the jaw, is thick and massive, and has on its anterior edge a peculiar character, a series of short, strong, oblique ridges. The symphysis in this mandible extends only to the middle of m^1, but its condition shows that anchylosis with its fellow had hardly begun, and that, consequently, its shortness is attributable to its youth, notwithstanding that m^4 is worn down to smooth surfaces. The depth of the jaw opposite m^1 is 38, that of *P. platyrhinus* being 32·5.

The associated limb is but a fragment with the four true molars in place and affords no further information. The third example is a right dentary limb, containing m^1, m^2, m^3, and half of m^4, the teeth being equally narrow and oblique posteriorly. The symphysis in this example extends to the hinder lobe of m^2. The fourth subject is similar to the last, but contains only m^1, m^2, and m^3. The symphysis is indistinct, but appears to have extended to the fore lobe of m^1. The teeth are similar in width and obliquity.

Fortunately the existence of this species is affirmed by other than mandibular testimony. Inferring from the narrowness of its teeth that *angustidens*, though equal in size to *mitchelli*, was more delicate in structure, I refer to it a nearly perfect humerus and a tibia which convey the same impression. The humerus differs generally from that of *mitchelli* in its comparative slenderness, and,

indeed, exceeds in this respect that of *platyrhinus;* it is 124·5 mm. long, and would be of exactly the same length as in *platyrhinus* but for an elongation of the ectotuberosity; both the breadth of the proximal end and the length of the condyles are as they are in the living species, the teretotriceps ridge is of the same extent and form. The head is a little and the great tuberosity much narrower, the latter is altogether different in shape from that of *mitchelli* and *platyrhinus* both, it rises high above the level of the head as an obtusely pointed backwardly inclined peak separated from the neck by a low transverse ridge. The facet on its posterior aspect is larger than in *platyrhinus* but less defined, and in the middle of its length it is more deeply impressed. The lesser tuberosity is, on the other hand, much less elevated, and is more distinctly connected with the greater by the tumid edge of the anterior surface of the shaft. On this aspect the greater tuberosity is much less convex than in other species. The pectoral ridge is not quite so distinctly continuous with the greater tuberosity as in *P. mitchelli*, but it is higher and at its distal end forms a larger and better defined tubercle. As in *P. mitchelli* the deltoid ridge terminates in a retroflected angle, but one of greater expansion. The prominence on the long oblique edge joining the ends of the two ridges is much larger and sharper, and from it a thread-like ridge, a rudimentary predeltoid, runs proximad for a few millimetres. The breadth of the shaft at its proximal third is 22½ mm.; at this point it is but 12·8 in antero-posterior thickness against 14·5 in *platyrhinus* and 17·5 in *mitchelli*. The length of the shaft from the convex edge between the tuberosities to the end of the pectoral ridge is 61·5 mm., in *platyrhinus* it is 59, and in *mitchelli* 55. As in *mitchelli*, the posterior limit of the head descends low and angularly upon the shaft, overhanging it more than in the stouter bone. The ridge for the humeral head of the triceps is wanting, or it may be represented by a very small prominence near the edge of the shaft. The anconal and coronal pits of the distal end have a large foramen in common. The condyles are narrow antero-posteriorly, the intercondylar rotular surface remarkably so. The outer condyle is almost perfectly globose.

The tibia, like the humerus, is unusually thin and angular. It its within two millimetres of the same length as that of *platyrhinus*, but in general form it most resembles that of *latifrons*, the curve of the shaft and more especially the dilatation of its anterior edge between the proximal and middle thirds being rather pronounced. The concave area beneath the popliteal notch is deeply excavated. The proximal end of the hinder side of the shaft is broader, the distal end of this surface narrower than in *platyrhinus* and its edges are sharper, as, indeed, are most of the edges of the bone. The distal articulation is reniform in shape, not, as usual, rhomboid; the articulating surface for the astragalus is elongated posteriorly, and is more distinct from the shaft than in *platyrhinus;* the inner malleolus is longer, and its scaphoid facet comparatively small. In short, a wombat tibia could hardly present more specific differences from the tibias of *mitchelli* and *platyrhinus* than does this bone.

We have thus two species of *Phascolomys* of co-equal size represented by limb bones as well as dental remains from the Darling Downs. Not one of these bones can, without violence to common sense, be identified with bones of *platyrhinus*. It would be absurd to deny that any of them belong to the common species of the period, *P. mitchelli*. The inference is irresistible that *P. mitchelli* and *P. platyrhinus* are distinct species.

It is a conclusion which is supported by a fine series of mandibles of *P. mitchelli* in the Queensland collection.